Japanese Kokai Patent Application No. Hei 11[1999]-220673

JAPANESE PATENT OFFICE
PATENT JOURNAL (A)
KOKAI PATENT APPLICATION NO. HEI 11[1999]-220673

PROGRAM SCHEDULE DISPLAY DEVICE AND METHOD

|	
Inventor:	Takayuki Nakajo
	NEC IC Microcomputer System Ltd.
	1-403-53 Kosugi-cho, Nakahara-ku,
	Kawasaki-shi, Kanagawa-ken
Applicant:	000232036
	NEC IC Microcomputer System Ltd.
	1-403-53 Kosugi-cho, Nakahara-ku,
	Kawasaki-shi, Kanagawa-ken
Agent:	Kaneyuki Matsuura, patent attorney

[There are no amendments to this patent.]

Abstract

Problems

With conventional devices, an operation to "pre-record [the numbers of] channels that the user watches frequently" must be performed by the user. This operation is complicated, and for example, around one hour is required to record 20 channels.

Means to solve

Channels that the user watches frequently are monitored by a CPU built into the tuner. When said channel has been watched continuously for more than n minutes (step 101), it is recorded in the "user program schedule" and displayed as the channel that that user watches most often (steps 102 and 103). The priority level for m recorded channels is also determined. When information for the m+1th must be recorded, the channel with the lowest priority level from among the channels recorded is deleted, and the new m+1th channel is recorded as the channel with the highest priority level (steps 105 and 106).
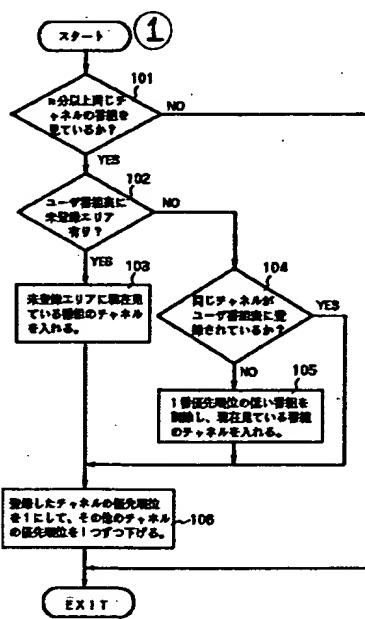
スタート ①

101 n分以上同じチャネルの番組を見ているか？ NO

102 ユーザ番組表に未登録エリア有り？ NO

103 未登録エリアに現在見ている番組のチャネルを入れる。

104 同じチャネルがユーザ番組表に登録されているか？ YES

105 NO 1番優先順位の低い番組を削除し、現在見ている番組のチャネルを入れる。

106 登録したチャネルの優先順位を1にして、その他のチャネルの優先順位を1つづつ下げる。

EXIT

Key:
1   Start
101   Has program on the same channel been watched more than n minutes?
102   Is there an unrecorded area in user program schedule?
103   Enter channel of program currently being watched into unrecorded area
104   Is same channel already recorded in user program schedule?
105   Delete program with lowest priority level and enter channel of program currently being watched
106   Make priority level of recorded channel 1, and lower the priority level of the other channels by 1

Claims

1. Program schedule display device characterized by the fact that, being the program schedule display device of a receiving device that receives digital satellite broadcast signals wherein program schedule data are multiplexed with video and audio data, digital satellite

broadcast signals for the desired channel are tuned in, and the audio and video signals on that channel are demodulated and output to the display device, it has

a user program schedule memory means that stores a user program schedule where the numbers of a prescribed number of channels that are watched are displayed as a list based on said program schedule data separated from said digital satellite broadcast signals, and displays it on said display device,

a monitoring means that monitors whether programs in said digital satellite broadcast signals have been watched on the same channel for a prescribed time,

a sensing means that senses whether there are unrecorded areas in said user program schedule only after it has been judged by said monitoring means that programs in said digital satellite broadcast signals have been watched on the same channel for more than a prescribed time,

and a first recording means that records in that unrecorded area at least the channel number from among said program schedule data separated from the digital satellite broadcast signals for the channel that has been watched for more than the prescribed time when it has been judged by said sensing means that there is an unrecorded area.

2. Program schedule display device described in Claim 1 and characterized by the fact that a priority level corresponding to each recorded channel number is recorded in said user program schedule; it has a second recording means that, when it is judged by said sensing means that there are no unrecorded areas, judges whether the same channel as the channel that has been watched for more than said prescribed time has been recorded in said user program schedule, and when it has not been recorded in said user program schedule, deletes the channel number with the lowest priority level; and a priority level change means that, when the priority level of a recorded channel number has been recorded by said first or second recording means or when it has been judged by said sensing means that there are no unrecorded areas, and the same channel number as said channel number that has been watched for more than the prescribed time is recorded in said user program schedule, gives the highest priority level to that recorded channel number and lowers the priority level of the other channel numbers.

3. Program schedule display device described in Claim 1 characterized in that it has a user program schedule prohibited channel description table into which any channel number can be input by the user, and channel numbers input to said user program schedule prohibited channel description table are prohibited from being recorded in said user program schedule even if they satisfy the recording criteria of said first recording means.

4. Program schedule display device described in Claim 2 and characterized by the fact that said user program schedule has a column in which a fixed flag can be recorded corresponding to said channel numbers, and channels for which a fixed flag with a prescribed

value are recorded will not be deleted from said user program schedule and are removed from having their priority level determined.

5. Program schedule display device characterized by the fact that, being the program schedule display device of a receiving device that receives digital satellite broadcast signals where program schedule data are multiplexed with video and audio data, digital satellite broadcast signals for the desired channel are tuned in, and the audio and video signals on that channel are demodulated and output to the display device, it has

a user program schedule memory means that stores a user program schedule in which the numbers of a prescribed number of channels that are watched, and priority level and total viewing time corresponding to each channel number are each displayed as a list based on said program schedule data separated from said digital satellite broadcast signals, and displays this on said display device,

a monitoring means that monitors the total viewing time for each channel among said digital satellite broadcast signals and judges whether there is an unrecorded channel with a viewing time that is longer than the total viewing time of the channel with the lowest priority level in said user program schedule,

a sensing means that senses whether there is an unrecorded area in said user program schedule only after it has been judged by said monitoring means that there is an unrecorded channel for which said viewing time is longer than the total viewing time for the channel with the lowest priority level in said user program schedule,

and a first recording means that, when it is judged by said sensing means that there is an unrecorded area, records the channel number, and the total viewing time and the priority level for it, from said program schedule data separated from the digital satellite broadcast signals, for the channel where said viewing time is longer than the total viewing time for the channel with the lowest priority level in said user program schedule.

6. Program schedule display device described in Claim 5 and characterized by the fact that it has: a second recording means that, when said sensing means has judged that there are no unrecorded areas, judges whether the channel for which said viewing time is longer than the total viewing time for the channel with the lowest priority level in said user program schedule has already been recorded in said user program schedule, deletes the number of the channel with the lowest priority level when it has not been recorded in said user program schedule, and records the channel number and the total viewing time of the programs currently being watched; and a priority level changing means that assigns priority levels in the order of length of total viewing times, after recording by said first or second recording means or when after it has been judged by said sensing means that there are no unrecorded areas, the number of the channel for which said

viewing time is longer than the total viewing time of the channel with the lowest priority level in said user program schedule has been recorded.

7. Program schedule display method characterized by the fact that, being the program schedule display method for a receiving device that receives digital satellite broadcast signals wherein program schedule data are multiplexed with video and audio data, digital satellite broadcast signals for the desired channel are tuned in, and the audio and video signals on that channel are demodulated and output to the display device,

a user program schedule where the numbers of a prescribed number of channels that are watched are displayed in the form of a list based on said program schedule data separated from said digital satellite broadcast signals, this is displayed on said display device, and at the same time, only when it is judged that programs in said digital satellite broadcast signals have been watched on the same channel for more than a prescribed time, it is sensed whether there is an unrecorded area in said user program schedule; when it is judged that there is an unrecorded area, at least the channel number, from among said program schedule data separated from the digital satellite broadcast signals, is recorded for the channel that has been watched more than said prescribed time.

8. Program schedule display method characterized by the fact that, being program schedule display method for a receiving device that receives digital satellite broadcast signals wherein program schedule data are multiplexed with video and audio data, digital satellite broadcast signals for the desired channel are tuned in, and the audio and video signals on that channel are demodulated and output to the display device,

a user program schedule in which the numbers of a prescribed number of channels that are watched, and the priority level and total viewing time corresponding to each channel number, are displayed in the form of a list based on said program schedule data separated from said digital satellite broadcast signals; this is displayed on said display device, and at the same time, the total viewing time for each channel in said digital satellite broadcast signals is monitored; only when it is judged that there is an unrecorded channel where the viewing time is longer than the total viewing time of the channel with the lowest priority level in said user program schedule, it is sensed whether there is an unrecorded area in said user program schedule; when it is judged that there is an unrecorded area, the channel number and the total viewing time and the priority level for that [channel] are recorded from said program schedule data separated from the digital satellite broadcasting signal for the channel where said viewing time is longer than the total viewing time of the channel with the lowest priority level in said user program schedule.

Detailed explanation of the invention

[0001]

Technical field of the invention

This invention is associated with a program schedule display device and method. In particular, it pertains to a program schedule display device and method in a digital satellite tuner.

[0002]

Prior art

Digital satellite broadcasting has more than 100 channels of video and audio program data, so the viewer needs time to search through the programs to find which program is on which channel. Thus, program schedule data are transmitted multiplexed with the program data as service information that allows the viewer to search through program schedules quickly.

[0003]

Currently, program information for digital satellite broadcasts cannot be obtained easily from newspaper television schedules or television program information magazines for terrestrial airwave broadcasting, such as the VHF band and UHF band terrestrial airwave television broadcast signals that are currently broadcast. In place of this, the digital satellite broadcast tuner receives program schedule data that are transmitted multiplexed with the program data in said way, processes them, and, as shown in Figures 12 and 13, provides a guide by displaying program guide information as an OSD, as with the Perfect TV digital satellite tuner sold currently. Figure 12 is taken from page 42 of the operation manual for the Panasonic digital broadcast tuner (Model TU-DSR10ST). Figure 13 is taken from page 32 of the operation manual for the Toshiba Kabushiki Gaisha digital broadcast tuner (Model CSR-P1).

[0004]

Problems to be solved by the invention

However, with conventional program schedule display devices that display program guide information as in Figures 12 and 13, no more than 10 channels can be displayed at once. However, more than 100 channels are provided with digital satellite broadcasting, e.g., Perfect TV, and it is expected that this number will continue to increase. Under these circumstance, even when one is only searching to see whether there are any programs that one finds interesting in the current broadcast, a list of all the programs broadcast at the same time cannot be confirmed without scrolling through the program schedule nine times, assuming that 10 channels can be displayed at one time.

[0005]

Thus, with said conventional program schedule display devices, there is a function to "pre-record programs that the user often watches" or a function to "skip channels that are not watched," as there is also on a normal television receiver, or there is a function to display said program display according to whether it is a "program recorded by the user" or a "program that the user has set to other than skip."

[0006]

However, the operation to "pre-record programs that the user often watches" must be performed by the user, and that operation is complicated (for example, it took the present inventor around 1 hour to record 20 channels).

[0007]

This invention was devised with the above points in mind. Its purpose is to provide a program schedule display device and method that can easily search for programs that the viewer wants from among digital satellite broadcast channels, when there are more than 100 channels.

[0008]

Means to solve the problems

In order to accomplish said purpose, the device of this invention is a program schedule display device for a receiving device that receives digital satellite broadcast signals wherein program schedule data are multiplexed with the video and audio data, tunes to the digital satellite broadcast signal of the desired channel, and demodulates the video and audio signals of that channel and outputs them to the display devices. It is constituted with: a user program schedule memory device that stores a user program schedule in which the numbers of a prescribed number of channels that are watched are displayed in the form of a list, based on program schedule data separated from digital satellite broadcast signals, that is displayed on a display device; a monitoring means that monitors whether programs in the digital satellite broadcast signals are watched on the same channel for more than a prescribed time; a sensing means that senses whether there is an unrecorded area in the user program schedule only when it is judged by the monitoring means that programs in the digital satellite broadcast signals are watched on the same channel for more than a prescribed time; and a first recording means that, only after it is judged by the sensing means that there is an unrecorded area, records in that unrecorded area at least the channel number, from the program schedule data separated from the digital satellite broadcast signals, for the channel that has been watched for more than the prescribed time.

[0009]

Also, the method of this invention, in order to accomplish said purpose, stores a user program schedule wherein the numbers of a prescribed number of channels that are watched are displayed as a list, based on program schedule data separated from the digital satellite broadcast signals, and they are displayed on a display device. In addition, it is sensed whether there are any unrecorded areas in the user program schedule only when it has been judged that programs for the digital satellite broadcast signals are watched on the same channel for more than a prescribed time. When it is judged that there is an unrecorded area, at least the channel number from the program schedule data separated from the digital satellite broadcast signals will be recorded in that unrecorded area for the channel that is watched for more than a prescribed time.

[0010]

With the device and method of this invention, said channel of the program that is watched continuously for more than a prescribed time is automatically recorded in the user program schedule and that user program schedule will be displayed. It is thus possible to display only a program schedule for channels that the user watches frequently, rather than having the user record complex channel skipping instructions or programs that are often watched, based on his favorite channels.

[0011]

Also, in order to accomplish said purpose, the device of this invention is constituted with: a user program schedule memory means that stores a user program schedule wherein a prescribed number of channel numbers that are watched, and the priority level and total viewing time corresponding to each channel, are displayed as a list, based on program schedule data separated from digital satellite broadcast signals, that is output to a display device; a monitoring means that monitors the total viewing time for each channel in the digital satellite broadcast signals and judges whether there is an unrecorded channel for which the viewing time is longer than the total viewing time of the channel with the lowest priority level in the user program schedule; a sensing means that senses whether there is an unrecorded area in the user program schedule only when it is judged by the monitoring means that there is an unrecorded channel for which the viewing time is longer than the total viewing time of the channel with the lowest priority level in the user program schedule; and a first recording means that, when it is judged by the sensing means that there is an unrecorded area, records in that unrecorded area the channel number and the total viewing time and priority level, from program schedule data separated from the digital satellite broadcast signals, for the channel where the viewing time is longer than the total viewing time of the channel with the lowest priority level in the user program schedule.

[0012]

Also, the method of this invention, in order to accomplish said purpose, stores a user program schedule wherein the numbers of a prescribed number of channels that are watched, and the priority level and total viewing time corresponding to each channel, are displayed as a list, based on said program schedule data separated from digital satellite broadcast signals, and displays it on a display device. At the same time, the total viewing time for each channel in the digital satellite broadcast signals is monitored, and it is sensed whether there is an unrecorded area in the user program schedule only after it is judged that there is an unrecorded channel for which the viewing time is longer than the total viewing time of the channel with the lowest priority level in the user program schedule. When it is judged that there is an unrecorded area, the channel number, and the total viewing time and the priority level, from program schedule data separated from the digital satellite broadcast signals, are recorded in that unrecorded area for the channel where the viewing time is longer than the total viewing time of the channel with the lowest priority level in the user program schedule.

[0013]

With the device and method of this invention, said channel for which the viewing time is longer than the total viewing time for the channel with the lowest priority level in the user program schedule is automatically recorded in the user program schedule and displayed on a display device. It is thus possible to display only a program schedule for channels that the user watches frequently, rather than the user having to record complex channel skipping instructions or programs that are often watched, based on his favorite channels.

[0014]

Embodiment of the invention

Next, an embodiment of this invention, along with figures, will be explained. Figure 1 is a system block diagram of one embodiment of a program display device that will be this invention. Figure 2 shows a block diagram of one example of the digital satellite tuner that is a major component of Figure 1. This program display device is constituted so that digital satellite tuner (1) is connected to satellite parabolic antenna (2) and to television receiver (3), as one example of a display device; digital satellite broadcast signals received by satellite parabolic antenna (2) are turned to the desired channel and decoded by digital satellite tuner (1); and the video and audio signals obtained are displayed on television receiver (3). Program schedule data are also separated from the digital satellite broadcast signals and a program schedule is displayed on television receiver (3).

[0015]

Also, remote control (4) is a known controller for turning the power on and off, setting channel tuning, controlling volume, and remotely indicating all other operations for digital satellite tuner (1). Each of the components of this system configuration has itself been known in the past, and this embodiment is characterized in how the program schedule is displayed on television receiver (3) by digital satellite tuner (1).

[0016]

Digital satellite tuner (1), as shown in the block diagram in Figure 2, for example, is constituted with tuner unit (12), QPSK [DPSK in figure] unit (14), transport stream demultiplexer (16), MPEG2 AV decoder (18), video encoder (20), and audio encoder (22), all connected to CPU (28) via CPU bus (27) along with read-only memory (ROM) (25) and random access memory (RAM) (26).

[0017]

In Figure 2, digital satellite broadcast signal (11) received by satellite parabolic antenna (2) is input to tuner unit (12), and data (13) of a specific frequency band corresponding to tuning data from central processing unit (CPU) (28) are removed and QPSK demodulated by QPSK unit (14) to produce transport stream (15). This is input to transport stream demultiplexer (16).

[0018]

Aforementioned transport stream (15) follows standards such as specified in DVB standard "ETS 300 468" (Europian [sic] Telecommunication Standard) and MPEG2 standard "ISO/IEC JTC1/SC29/WG11 NO801" (ISO IEC 13818-1), etc. One transport stream is 188 bytes. As shown in Figure 3 (a), it is constituted with ID (31) and program data (33) synthesized in time series, or as shown in Figure 3 (b), constituted with ID (31), stream control table (32), and program schedule data (34) synthesized in time series.

[0019]

Information, e.g., channel program data (33), stream control table (32) and program schedule data (34) for one of said channels are input in time division to transport stream demultiplexer (16). Thus, only program data for the channel that the user (viewer) has currently designated are taken out and input as separated program data (17) to MPEG2 AV decoder (18) in Figure 2. MPEG2 AV decoder (18) decodes audio and image data. Image data (19) are supplied to video encoder (20), and audio data (21) are input to audio encoder (22).

[0020]

Video encoder (20) encodes the input image data and outputs video signal (23). Audio encoder (22) encodes the input audio data and outputs audio signal (24). Video signal (23) and audio signal (24) are input to the AV terminal of television receiver (3), an image is displayed, and audio is output.

[0021]

Next, to explain transport stream demultiplexer (16) further, transport stream demultiplexer (16) distinguishes ID (31) shown in Figures 3 (a) and (b), defined by the DVB standard, from the input transport stream to identify the contents and next distinguishes information, e.g., table (32) that controls the stream of data that has been sent, program data (33), and program schedule data (34). Of these, program schedule data (34) are data wherein program name (41), program start time (42), program end time (43), program broadcast channel number (44), broad program genre category name (45), narrow program genre category name (46), and the like are included in a representative program schedule, as shown in Figure 4.

[0022]

Program schedule data (34) also includes a large amount of information other than the information required by this embodiment, and CPU (28) in this embodiment creates a table, as shown in Figure 4, for each channel from that [data] and stores it in RAM (26) of Figure 2. Then, when the channel, program name, etc., must be displayed, CPU (28) converts them to a displayable format, according to the program read from ROM (25), and outputs them to video encoder (20) via CPU bus (27). Video encoder (20) displays a program schedule as shown in Figure 9 using OSD or the like, in addition to displaying regular programs that are input from regular input image data (19).

[0023]

Finally, with this embodiment, the user program schedule shown in Figure 6 is created. When the user has watched the same program for more than a prescribed time, the channel that is currently being watched is recorded in place of the oldest data in the user program schedule in Figure 6. There is also another type of "user program schedule," as shown in Figure 7, where channels that have been viewed for the longest total time are recorded. For the priority level, the lower the degree of priority, the larger the number.

[0024]

Next, the operation of the first embodiment of this invention will be explained. Figure 5 shows a flowchart of the first embodiment of this invention. With this embodiment, the number of channels recorded is set at 5, but the number of channels recorded can be changed according to the system settings, RAM capacity, etc.

(User program schedule initialization)

As user program schedule initialization values, everything is set to an unrecorded state. Representative programs are temporarily stored in advance and delivered. Other methods could also be considered, e.g., asking the user to input a favorite genre (e.g., sports) and storing representative channels in that genre.

(User program schedule recording and deletion)

With this embodiment, CPU (28) first monitors whether the user has watched a certain channel more than n minutes (step 101 in Figure 5). Here, the value of said "n minutes" could be input by the user or could be determined in advance, 30 minutes, for example, when the system is delivered. Also, monitoring by CPU (28) of whether the same channel has been watched for more than n minutes can be accomplished simply by operating a program that will check once a minute, using a timer that is built into CPU (28) or that is externally attached, and continuing to check until 30 minutes is reached, so a detailed explanation is omitted here.

[0025]

Next, if it has been judged that the user has watched a certain channel for more than n minutes, it is judged whether there is an unrecorded slot in the user program schedule (step 102 in Figure 5). If it is judged that the user has watched for less than n minutes, processing is completed without any action being taken. Judgment of non-recorded status will be performed to distinguish channel numbers, etc., that are not currently present or will not be present in future. When it is determined at step 102 that there is an unrecorded area in the user program schedule, the channel of the program that is currently being watched is input into the unrecorded area (step 103 in Figure 5). Thus, in the user program schedule shown in Figure 6 (a), for example, when the number of the channel that has been watched for more than n minutes is 201, '201' is written to the channel number space in the unrecorded area, as shown in Figure 6 (b).

[0026]

On the other hand, when there are no unrecorded areas in the user program schedule, it is determined whether the same channel has already been recorded in the user program schedule

(step 104 in Figure 5). If it has been recorded, the process jumps to step 106, discussed below. When it has not been recorded, the program with the lowest priority level is deleted and the channel of the program currently being watched is entered (step 105 in Figure 5). For example, when the user program schedule is as shown in Figure 6 (c), channel 300 is fifth in priority level and has the lowest priority. So if the channel that is currently being watched is channel 201, channel 300 is deleted and channel 201 is recorded, as shown in Figure 6 (d).

[0027]
Finally, the priority level of the channel currently being watched is made 1 at step 106, and the priority level of each of the other channels is lowered by 1 (step 106 in Figure 5). Thus, when the user program schedule is as shown in Figure 6 (d), channel 201 is made priority level 1, as shown in Figure 6 (e), and the priority level of channel 205, that was 1 up to that point, is lowered to 2, the level of channel 200 that was 2 is lowered to 3, the level of channel 323 that was 3 is lowered to 4, and the level of channel 411 that was 4 up to that point is lowered to 5.

(Program display using the user program schedule)
The user program schedule will then have five channels stored in the channel number column, as shown in Figure 6 (c). In this case, when the user selects the program schedule function using the user program schedule, the program schedule is displayed in relation to the current time for each channel, or to the time designated by the user. The display of program schedules for each of the five channel numbers recorded in the user program schedule is retrieved according to program broadcast start time (42) and program end time (43) in Figure 4, where programs that are broadcast at a designated time are arranged for each channel. Retrieved channel number (44), program name (41), narrow genre category name (46), start time (42), and end time (43) are each displayed on television receiver (3) as part of a list, as shown in Figure 9.

(Manual updating of the user program schedule)
Some problems arise during use if the user program schedule is only updated automatically. For example, when more programs are frequently watched than [can fit] in the user program schedule, the channels are replaced frequently, or conversely, the channel for a program that the user wants to see is not readily recorded. There may also be cases where a channel that is currently being watched is sometimes viewed for more than n minutes, but the user does not want to record it in the user program schedule. Therefore, remote control (4) in Figure 1 is furnished with a user program schedule record key, a user program schedule delete key, etc. to modify the user program schedule, and channels currently being watched can be recorded in or deleted from the user program schedule with a simple operation.

(Prohibiting recording in the user program schedule, and fixed [channel] recording in the user program schedule)

Depending on the user, there may also be specific channels that, while they are watched for a great deal of time, do not need to be recorded in the user program schedule. A user program schedule prohibition description table, as shown in Figure 10, is set up for this type of program. By having the user input prohibited channels, they will not be recorded, even if they satisfy the conditions for being recorded in the user program schedule.

[0028]

Conversely, in the case of channels that are not watched for more than n minutes but that are watched often, perhaps daily, a method of recording said channels in the user program schedule on a fixed basis, regardless of whether they are watched for more than n minutes, is also allowed for. Thus, a column in which a fixed flag can be recorded, as shown in Figure 11, is further furnished in the user program schedule shown in Figure 6. When the fixed flag is recorded as 1, the channel will not be deleted from the user program schedule. Also, channels for which the fixed flag is 1 in Figure 11 are exempted from having the priority level determined for the channel. Thus, for channels for which this fixed flag is 1, the part with the priority level number could be an indefinite value.

[0029]

In this way, with the first embodiment, the channels that the user actually watches frequently are monitored by a CPU that is built into the tuner. When said channel are watched continuously for more than n minutes, they will be automatically recorded, as the channels that the user watches most often, in the "user program schedule" and displayed. The user will thus be able to search quickly for channels with programs that he wants from among the channels in a digital satellite broadcast with more than 100 channels.

[0030]

Also, the priority level of m recorded channels is determined, and when information for the m+1th must be recorded, the channel with the lowest priority level among the channels that have already been recorded will be deleted and the new m+1th channel will be recorded as the channel with the highest priority level. In this way, operations by the user, such as channel skipping or recording himself the channels that he often watches can be eliminated.

[0031]

Next, a second embodiment of this invention will be explained along with Figures 7 and 8. Figure 8 shows a flowchart for the second embodiment of this invention. The difference between this embodiment and the first embodiment is that processing step 101 in the first embodiment will be processing step 201 in the second embodiment, and processing step 106 in the first embodiment will be processing steps 206 and 207 in this second embodiment. With the first embodiment, channels recorded in the user program schedule in Figure 6 will be replaced using viewing of more than n minutes as the trigger, and with the second embodiment, channels will be recorded if the total viewing time exceeds the time recorded in the current user program schedule in Figure 7.

[0032]

In short, it is first determined whether the total viewing time that the user has watched a certain channel is greater (longer) than the total viewing time of 20.5 hours for the channel with the lowest priority level 5 that is recorded in the current user program schedule shown in Figure 7 (step 201 in Figure 8). When the total viewing time is less than 20.5 hours, processing is completed without any action being taken. Only when viewing time is longer than 20.5 hours is it determined whether there is an unrecorded area in the user program schedule (step 202 in Figure 8). Judgment of non-recorded status will be performed to distinguish channel numbers, etc. that are not currently present or will not be present in future.

[0033]

When it is determined that there is an unrecorded area in the user program schedule at step 202, the channel and the day and time of the program currently being watched are entered in the unrecorded area (step 203 in Figure 8). On the other hand, when there are no unrecorded areas in the user program schedule at step 202, it is determined whether the same channel has already been recorded in the user program schedule (step 204 in Figure 8). If it has been recorded, the process jumps to step 206, discussed below. If that channel has not been recorded, the program with the lowest priority level is deleted and the channel and day and time of the program currently being watched are entered (step 205 in Figure 8).

[0034]

After the processing in step 203 or 205 is completed, when it is determined that the same channel has not already been recorded in the user program schedule at step 204, the total viewing time is updated (step 206 in Figure 8), and then priority levels are assigned in order of total length viewing time (step 207 in Figure 8).

[0035]

In this way, with this embodiment, channels that the user actually watches frequently are monitored by a CPU built into the tuner, and the channels that the user watches most often will be automatically recorded in the "user program schedule" and displayed. The user will thus be able to search quickly for channels with programs that he wants from among the channels in a digital satellite broadcast with more than 100 channels. Also, priority levels are assigned in order of total viewing time, so that the channel for the program that has the longest total viewing time will be priority level 1, making it possible to eliminate operations such as tedious channel skipping and recording of programs that are often watched.

[0036]

Note that this invention is not limited to the embodiment above. For example, the second embodiment can also be applied where there is a user program schedule prohibited channel description table into which any channel number is input by the user. For channel numbers input into the user program schedule prohibited channel description table, even when the recording operations of steps 203 and 205 are performed, recording in the user program schedule is prohibited. It can also be applied where the user program schedule has a column where a fixed flag corresponding to a channel number can be recorded as shown in Figure 11. Channels for which a fixed flag with a prescribed value is recorded will not be deleted from the user program schedule, and are excluded from having their priority level determined.

[0037]

Effect of the invention

As explained above, with this invention, channels that a user actually watches frequently are monitored by a CPU built into the tuner. When a program on the same channel is watched for more than a prescribed time, or if the total viewing time exceeds a time recorded in the current user program schedule, recording to the user program schedule is updated and the channel that the viewer watches most often is automatically recorded in the user program schedule and displayed. The user will thus be able to search easily for channels with programs that he wants from among the channels in a digital satellite broadcast with more than 100 channels.

[0038]

Also, with this invention, the priority level of m recorded channels is determined, and when information for the m+1th channel must be recorded, the channel with the lowest priority level among the channels that are already recorded is deleted, and a new m+1th channel is

recorded as the channel with the highest priority level. Thus, operations by the user, such as channel skipping or recording himself the programs that he often watches will not be necessary, and operability can be improved over that of the past.

Brief description of the figures

Figure 1 is a system block diagram of one embodiment of a program display device that will be this invention of this invention [sic].

Figure 2 is a block diagram of one example of a digital satellite tuner that is the major component of Figure 1.

Figure 3 shows one example of the format of program data and program schedule data multiplexed in the digital satellite broadcast signals.

Figure 4 shows the configuration of an example of program schedule data.

Figure 5 is a flow chart for a first embodiment of this invention.

Figure 6 shows various examples of user program schedules.

Figure 7 shows another example of a user program schedule.

Figure 8 is a flowchart for a second application example of this invention.

Figure 9 shows one example of the display of a user program schedule.

Figure 10 shows the user program schedule prohibited channel description table.

Figure 11 shows still another example of a user program schedule.

Figure 12 shows one example of the display of conventional program guide information.

Figure 13 shows another example of the display of conventional program guide information.

Explanation of symbols

1	Digital satellite tuner
2	Satellite parabolic antenna
3	Television receiver
4	Remote control
12	Tuner unit
14	QPSK unit
16	Transport stream demultiplexer
18	MPEG2 AV decoder
20	Video encoder
22	Audio encoder
28	Central processing unit (CPU)
31	ID

32	Stream control data
33	Program data
34	Program schedule data
101-106, 201-207	Processing steps

衛星用パラボラ
アンテナ
2

衛星ディジタル
チューナ
1

テレビ受像機
3

4 リモート
コントローラ
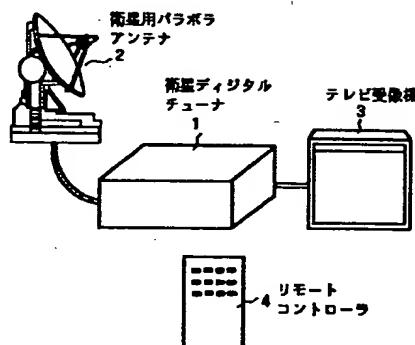
Figure 1

Key:	1	Digital satellite tuner
	2	Satellite parabolic antenna
	3	Television receiver
	4	Remote control
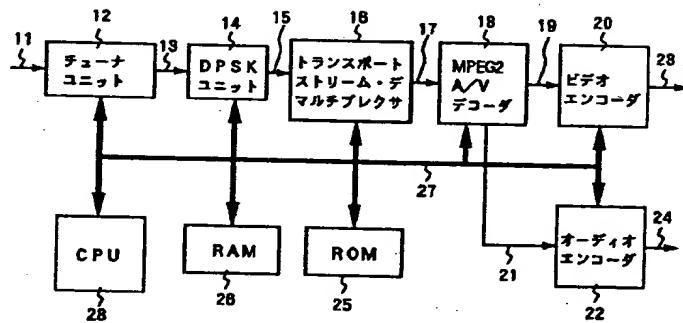
Figure 2

Key:	12	Tuner unit
	14	DPSK unit
	16	Transport stream multiplexer
	18	MPEG2 A/V decoder
	20	Video encoder
	22	Audio encoder
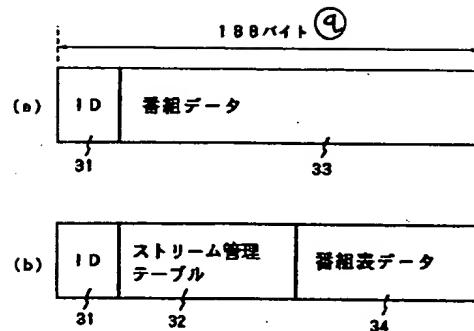
Figure 3

Key: a   188 bytes
32   Stream control table
33   Program data
34   Program schedule data
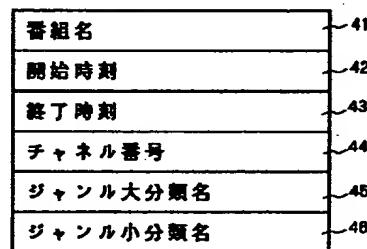
Figure 4

Key: 41   Program name
42   Start time
43   End time
44   Channel number
45   Broad genre category name
46   Narrow genre category name
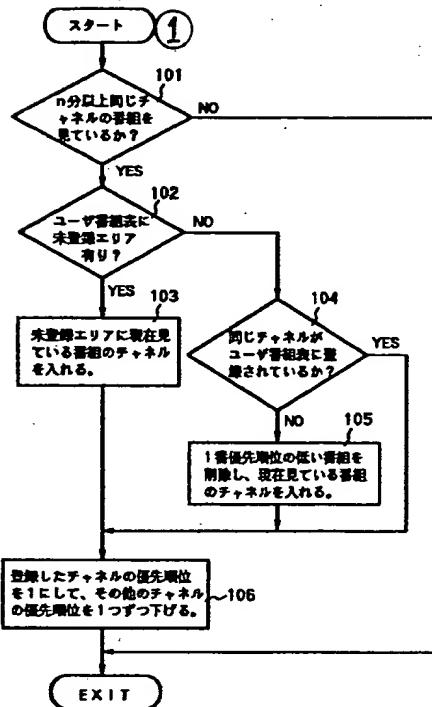
Figure 5

Key: 1   Start
101   Has program on the same channel been watched more than n minutes?
102   Is there an unrecorded area in user program schedule?
103   Enter channel of program currently being watched into unrecorded area
104   Is same channel already recorded in user program schedule?
105   Delete program with lowest priority level and enter channel of program currently being watched
106   Make priority level of recorded channel 1, and lower the priority level of the other channels by 1

(a)

① チャネル番号	② 優先順位
200	2
205	1
未登録	
未登録	
未登録	

(d)

① チャネル番号	② 優先順位
200	2
205	1
201	
323	3
411	4

(b)

① チャネル番号	② 優先順位
200	2
205	1
201	
未登録	
未登録	

(e)

① チャネル番号	② 優先順位
200	3
205	2
201	1
323	4
411	5

(c)

① チャネル番号	② 優先順位
200	2
205	1
300	5
323	3
411	4

Figure 6

Key; 1   Channel number
      2   Priority level

① チャネル番号	② 優先順位	③ トータル視聴時間 (h)
200	2	200.5
205	1	300.5
300	5	20.5
323	3	150.0
411	4	100.0

Figure 7

Key: 1   Channel number
      2   Priority level
      3   Total viewing time (h)
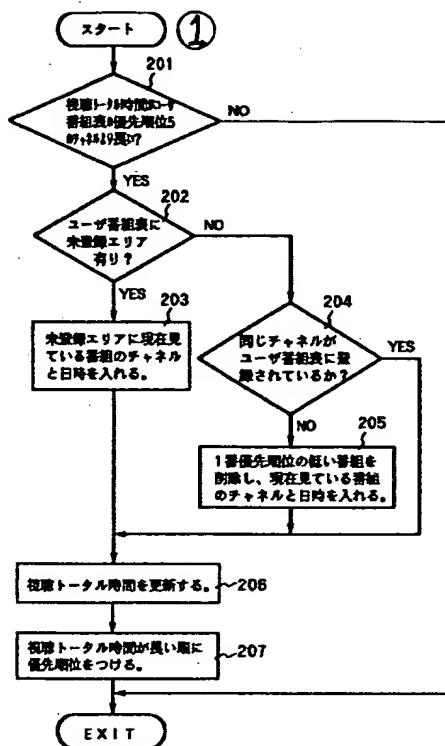
Figure 8

Key:
	1	Start
	201	Is total viewing time longer than the channel with priority level 5 in the user program schedule?
	202	Is there an unrecorded area in user program schedule?
	203	Enter channel and day and time of program currently being watched into unrecorded area
	204	Is the same channel already recorded in user program schedule?
	205	Delete program with lowest priority level and enter channel and date and time of program currently being watched
	206	Update total viewing time
	207	Assign priority levels in order of length of total viewing time

Figure 9

Key: 1   Channel number
2   Program name
3   Narrow genre category name
4   Start time
5   End time
6   Soccer
7   Movie (Western)
8   Movie (Japanese)
9   Baseball
10   Drama 1

① ユーザ番組表記載禁止チャネル番号
200
205
300
311
400

Figure 10

Key: 1   User program schedule prohibited channel description

① チャネル番号	② 優先順位	③ 固定フラグ
200 ④ 不定値		1
205	1	0
206	2	0
207	3	0
208	4	0

Figure 11

Key: 1   Channel number
2   Priority level
3   Fixed flag
4   Indefinite value
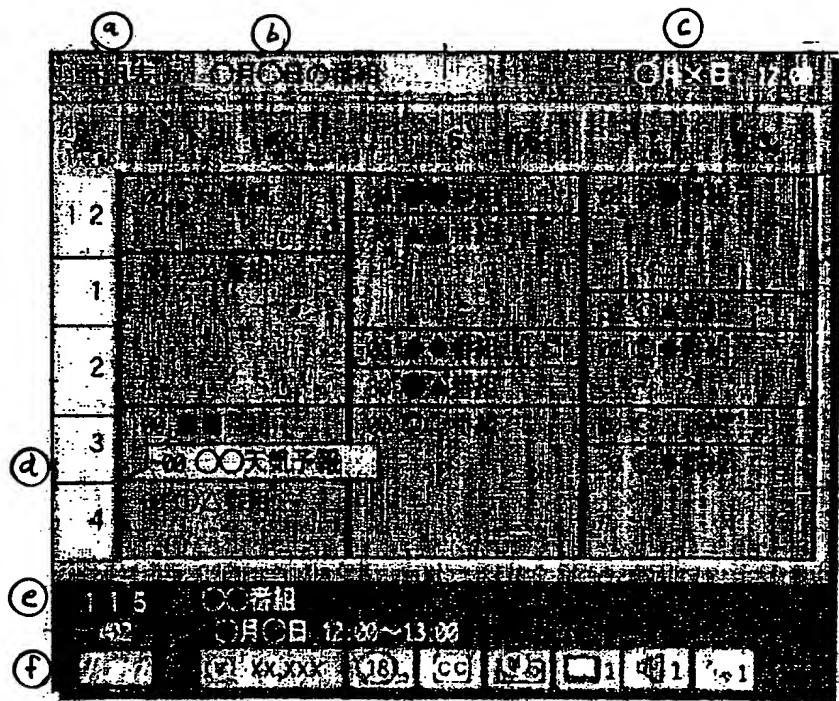
Figure 12

Key: a   Program schedule*
      b   Program on __ Month __ Day
      c   __ Month __ Day 12:00
      d   __ __ Weather forecast
      e   __ __ Program
      f   __ Month __ Day 12:00-13:00
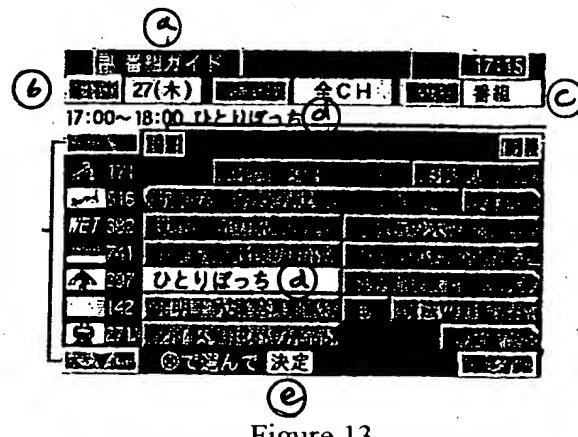
Figure 13

Key: CH   All channels
      a   Program guide

---

* [Editor's note: Prior art Figures 12 and 13 were largely illegible on the copies provided. The translator deciphered enough of the text that the reader can get an idea of prior satellite TV art in Japan. The squares, circles, triangles and other symbols in Figure 12 serve as non-specific placeholders.]

b   27 (Wed.)

c   Program

d   *Hitoripocchi* ["All Alone"]

e   Decide by selecting …